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Preoperative fasting for adults to prevent perioperative complications

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CAGS Evidence Based Reviews in Surgery

In September 2000, the Canadian Association of General Surgeons (CAGS) initiated an Internet-based journal club entitled "CAGS Evidence Based Reviews in Surgery (CAGS-EBRS)" to help practising clinicians improve their critical appraisal skills. Beginning in October 2005, EBRS will be made available to members of the American College of Surgeons (ACS). During the academic year, 8 clinical articles are chosen for review and discussion. Both methodologic and clinical reviews of the article are performed by experts in the relevant areas. The *Canadian Journal of Surgery* publishes 4 of these reviews each year, and the remaining 4 are published by the *Journal of the American College of Surgeons.* Each review will consist of an abstract of the selected article and a summary of the methodologic and clinical reviews. We hope that readers will find these useful and learn skills that can be used to evaluate other articles. For more information about the CAGS-EBRS or information about partcipating in the program, send an email to mmckenzie@mtsinai.on.ca or access the CAGS Web site www.cags-accg.ca or the ACS Web site www.facs.org.

Selected article

Brady M, Kinns SP. Preoperative fasting for adults to prevent perioperative complications. The Cochrane Library (Issue 1) 2004. Chichester (UK): John Wiley & Sons.

Abstract

Objective: To systematically review the effect of different preoperative fasting regimens (duration, type and volume of permitted intake) on perioperative complications and patient well-being in low-risk patient populations. **Data sources:** Electronic databases (MEDLINE, CINAHL, Cochrane Central Register of Controlled Trials and National Research Register, UK). Also, experts in the area were consulted and various worldwide anesthesia references lists and personal communications were included. **Study selection:** Randomized controlled trials that compared the effect of postoperative complications of different preoperative fasting regimens on adults. **Outcome measures:** Primary outcomes were: rates of adverse events (e.g., aspiration or regurgitation) or those following aspiration, including related morbidity (e.g., aspiration pneumonia) or operation-related death; volume or pH, or both, of gastric contents (on induction of anesthesia); and concentration of marker dye (e.g., bromsulfalein) as an indicator of gastric emptying. **Results:** Thirty-eight randomized controlled comparisons (made within 22 trials) were identi-

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fied. Most were based on "healthy" adults who were not considered at risk for regurgitation or aspiration during anesthesia. There was no evidence that the pH volume of participants' gastric contents differed significantly depending on whether they were permitted a shortened preoperative fluid fast or continued the standard fast. Second, participants given a drink of water preoperatively were found to have a significantly lower volume of gastric contents than the participants who followed the standard fasting regimen. The difference was modest and clinically insignificant. There was no indication that the volume of fluid given preoperatively (i.e., high or low) resulted in a difference in outcomes from those that followed a standard fast. **Conclusions:** There is no evidence to suggest that a shortened fluid fast results in an increased risk of aspiration or related morbidity compared with the standard policy of nil by mouth (NPO) from midnight. Participants permitted to have water preoperatively had significantly lower gastric volumes.

Commentary

Classical surgical and anesthesia dictum has been that patients who receive a general anesthetic should be kept NPO from midnight the night before operation, to minimize the chance of aspiration of gastric contents during induction of anesthesia. Is this policy really necessary in patients undergoing operation who are not considered "at risk" for delayed gastric emptying or, rather, is it archaic and nonscientific in light of published studies based on what we know about the rates of gastric emptying after a meal of liquid or solids, or both? This issue's review, which is a Cochrane Library meta-analysis, addresses this issue.

Concern about pulmonary aspiration of gastric content stems from the very real possibility of esophagopharyngeal reflux of intragastric contents on induction of general anesthesia in patients with a full stomach. The possibility of reflux or aspiration is especially pertinent in patients with recent oral intake of liquids or solids (or both) or in patients with gastric outlet or intestinal obstruction. Indeed, anesthetic techniques of "rapid sequence induction" are used in the latter group known to be at increased risk of aspiration.

In patients who are not at risk for gastric dysfunction, gastric emptying of liquids is rapid and linear. The half-emptying time ($T_{\frac{1}{2}}$) (the time to empty half of the oral liquid meal) of a nonfatty, liquid meal is 15–20 minutes so that by 90 minutes after ingestion, virtually all of the liquid meal has been emptied.[1] Gastric emptying of solids is more complex, and there is a lag phase, dependent on the amount of physical digestion or trituration needed to break down the solid particles to ≤1 mm in diameter so they may empty through the pylorus,[2] and there is an exponential phase of emptying dependent on quantity and type of nutrient (fats empty slower than proteins or carbohydrates).[3] Each type of solid meal will have slightly different physical characteristics and therefore different emptying times.[4] Ingested solids that cannot be broken down by trituration to ≤1 mm eventually leave the stomach at the end of the postprandial motor pattern (which usually lasts 2–3 h after a meal) with the return of the so-called interdigestive motor pattern or the migrating motor complex. This "interdigestive" propulsive pattern of motility is omnipresent during fasting and very effectively empties the stomach of the nondigestible solid debris (>1 mm in diameter) left over after the solids within the meal have been physically broken down.[5] Therefore, arguing from a purely physiologic view, one would not expect the stomach of a normal, "not at risk" patient to have any residual volume 90 minutes after a liquid, breakfast-like meal. Similarly, after a breakfast-like meal of easily digestible solids (toast, eggs, etc.) the stomach should be virtually empty of the meal by 3 hours after ingestion.

This meta-analysis included 38 randomized controlled trials which included mainly adults who were not considered to be at increased risk of regurgitation or aspiration during anesthesia. The trials varied in their design, so some studies included water, clear liquid drinks or isotonic drinks taken between 90 and 180 minutes before anesthesia. The comparison group had a standard fast (i.e., NPO after midnight). None of the studies compared a shortened fast after a diet of solid food to a standard fast. All of the trials had surrogate outcome measures (intraoperative gastric volume and pH) as their primary outcome measures. Clinically relevant outcomes such as aspiration, regurgitation and their sequelae were not considered, probably because they are rare events. Although there are physiologic reasons for there being a correlation between these outcomes and clinically relevant outcomes, in fact there are no data to confirm this.

Various analyses were performed, and in all cases there were no differences in outcome between the 2 groups with the exception that participants who were given a drink of water preoperatively had a substantially lower volume of gastric contents than those in the standard fasting group. The difference, however, was not clinically significant. The conclusion of this meta-analysis was that "there is no evidence to suggest shortened fluid fast results in an increased risk of aspiration or related morbidity compared with the standard 'nil by mouth from midnight' fasting policy. Permitting patients to drink water preoperatively resulted in significantly lower gastric volumes. Clinicians should be encouraged to appraise this evidence for themselves and when necessary adjust any remaining standard fasting policies for patients that are not considered 'at

risk' during anaesthesia."

The current guidelines of the American Society of Anesthesiologists[6] recommend that adults stop intake of solids for at least 6 hours and clear fluids for 2 hours or more, before induction of anesthesia. The Canadian Anaesthetists' Society[7] recommends a total fast of no less than 5 hours and suggests that policies be constructed within individual departments. Despite these recommendations, a standard fast of NPO after midnight is the practice in most institutions.

Should practice change because of this meta-analysis? Although this review has included a relatively large number of trials and they have uniformly shown no difference in outcome with a shorter fast, the problem is that the outcomes were not those that are clinically relevant. Thus, one now has to decide whether the evidence is strong enough from this systematic review to extrapolate the results into practice or whether a larger randomized controlled trial should be done to determine if the rate of aspiration or regurgitation is also not significantly different with a shortened fast. As well, the results of this review are limited because they only pertain to patients who are at low risk for aspiration and regurgitation.

Although it may seem a trivial question whether a shortened fast should be allowed, potentially there are important consequences. Patients often come to the operating room dehydrated because of prolonged fasts. Patient satisfaction might be improved with a shortened fast. A shortened fast might also decrease delays in emergency surgery. On the other hand, the "NPO after midnight" affords the greatest flexibility to the operative team in reorganizing "the list" as is often necessary because of unexpected factors that arise.

Competing interests: None declared.

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